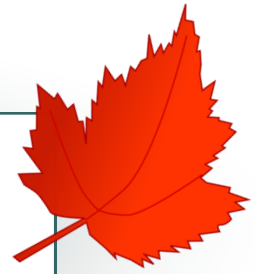
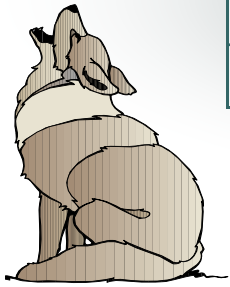


Coyote Crier

National Weather Service—Tucson, AZ

Volume 24, Issue 2



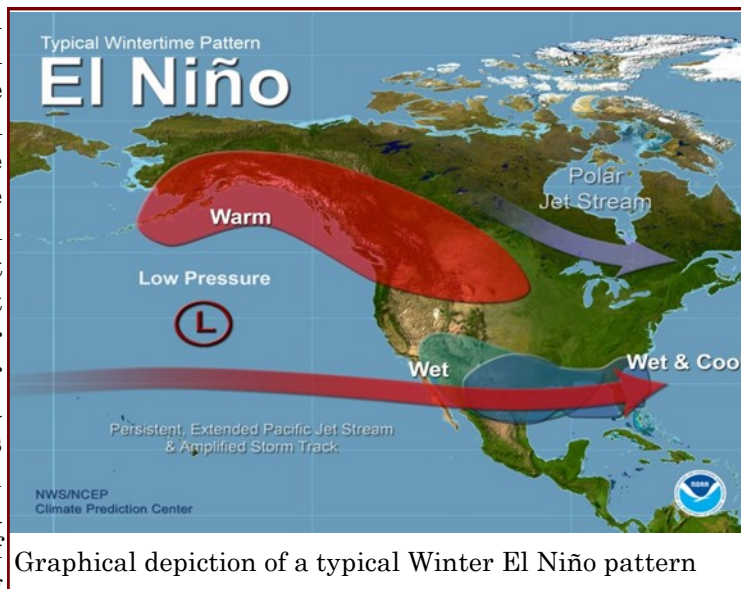
2018-2019 Winter Outlook for Southeast Arizona

By: Glenn Lader, General Meteorologist

As another very warm year wraps up, which also featured above normal precipitation in southeast Arizona, we look ahead at what the upcoming winter will bring us. The most significant factor that goes into our winter outlook is El Niño or La Niña. El Niño is a warming of the waters in the equatorial Pacific Ocean, while La Niña is a cooling of those waters. Heading

into this winter we are just shy of El Niño levels, which are defined by waters in this region being at least 0.5°C above normal. The official forecast from the Climate Prediction Center (CPC) indicates there is an 80% chance of an El Niño developing this winter.

What does an El Niño



Graphical depiction of a typical Winter El Niño pattern

mean for our winter weather? A typical El Niño pattern results in both above normal temperatures and above normal precipitation as the southern branch of the jet stream tends to direct storms across the southern tier of the U.S. While not every El Niño results in this scenario, the vast

majority do for southeast Arizona. From that standpoint alone, we'd be looking at much better chances of above normal precipitation. This winter's El Niño is likely to be categorized as weak (0.5°-0.9°C above normal) or moderate (1.0°-1.4°C above normal). Historically, moderate or stronger El Niño's

Inside this issue:

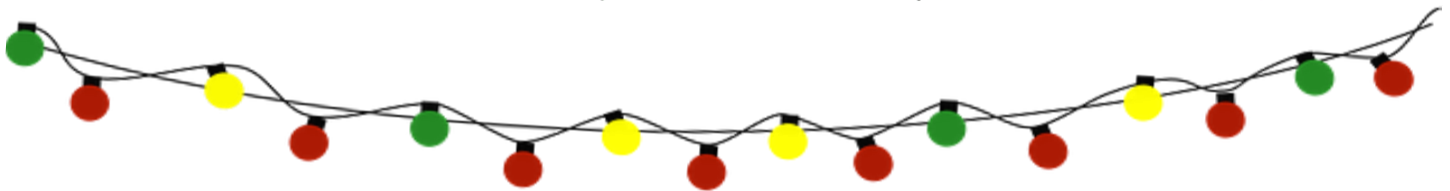
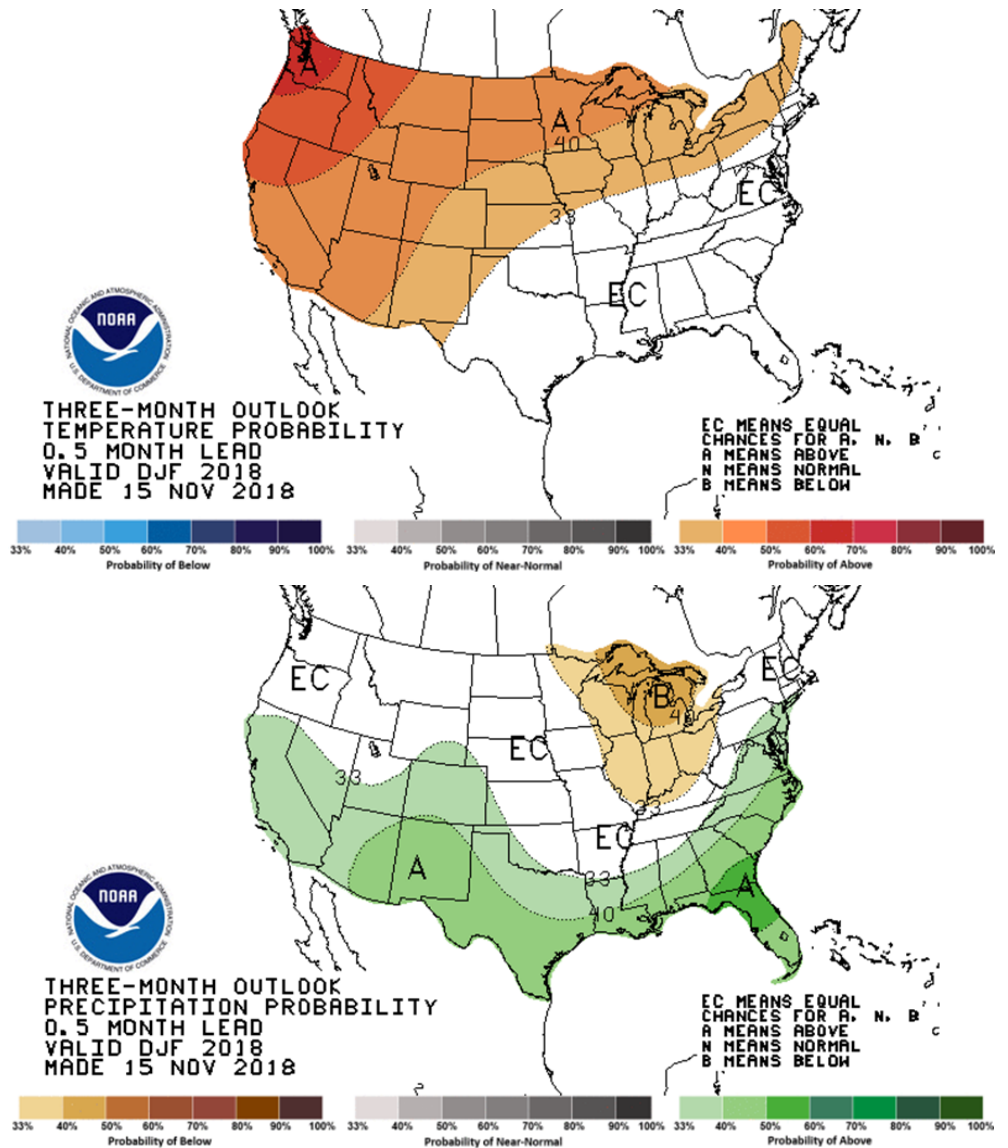
<i>Goes 17 Operational</i>	3
<i>Monsoon Rainfall</i>	4
<i>Spotter Review</i>	5
<i>Winter Wonderland Crossword</i>	6
<i>Severe Weather Wrap-up</i>	7
<i>Border Patrol Class</i>	9
<i>New Staff Arrivals</i>	10

usually lead to above normal precipitation with a bit more of a mixed record for the weaker El Niño's.

The official forecast from the CPC, which looks at El Niño and other factors including seasonal climate forecasting models, is also predicting better chances of above

normal temperatures and above normal precipitation. Even if the winter does end up being warmer and wetter than average in southeast Arizona, that doesn't mean our winter storms won't be capable of producing significant mountain snow. Additionally, heavy valley rain, even valley snow, wind, and freezing temperatures can all cause hazards for motorists and others. Therefore, always keep on top of the latest forecast information so you aren't caught unprepared.

Official forecasts from the Climate Prediction Center which depict better chances of above normal temperatures (top) and above normal precipitation (bottom).



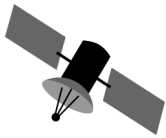
Rainfall Reports

When reporting your rainfall amounts to the NWS, remember we are looking for significant reports in real time. Generally, this means rainfall greater than or equal to a half inch (0.50") in less than an hour. Be sure that if your rainfall amount exceeds this threshold, and to promptly report it so that it can be used in our decision making process for warnings and advisories. Due to the advent of CoCoRaHS (Community Collaborative Rain, Hail and Snow) and RainLog, we no longer collect rainfall amounts on a daily or monthly basis. If you would like to report your rainfall amounts on a more regular basis, see the links below for CoCoRaHS or RainLog.

CoCoRaHS—<https://cocorahs.org/>

or

RainLog—<https://rainlog.org/>



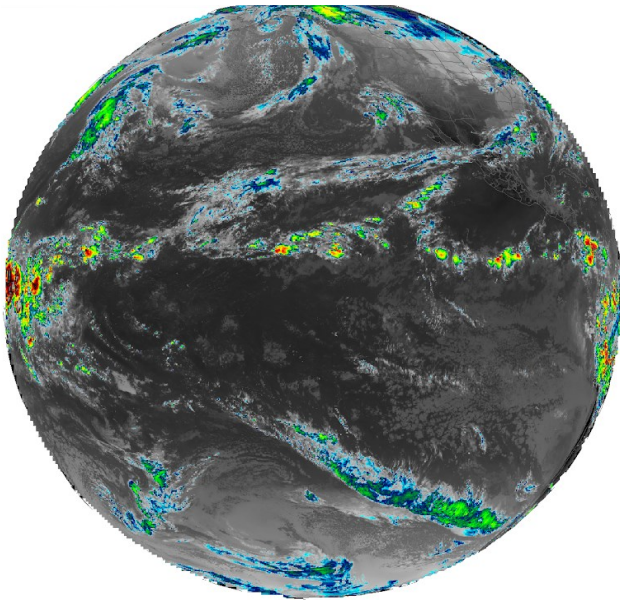
GOES-17 becomes Operational in Early January

By: Dan Leins, Science & Operations Officer

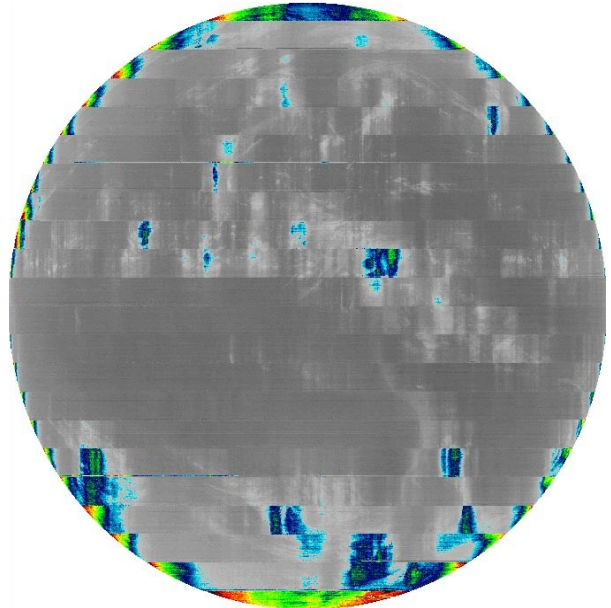
GOES-17, the second in the R-series of satellites which launched into orbit in March of 2018, will become “operational” in early January and will be used by meteorologists across the western United States on a daily basis. GOES-16, the first R-series satellite which was launched in 2016, is currently in use across the central and eastern portions of the country. GOES-17 is identical to GOES-16 and brings the same datasets to forecasters (more frequent/high resolution imagery and lightning detection). Unfortunately, there have been a few bumps in the road with the cooling system aboard GOES-17 which have led to some delays in

making it operational. Most folks think of space as a cold dark place, and they’d be correct. However, satellites can warm up significantly when directly exposed to the sun and for that reason, GOES-16 and 17 are outfitted with a cooling system. Unfortunately a problem was discovered with the cooling system aboard GOES-17 shortly after launch which resulted in a significant loss of data several hours each day. The loss of data was greatest during the overnight hours (when the imaging sensors are exposed to direct sunlight), with little to no degradation noted during the day (when the sun is located behind the imaging sensors).

Unfortunately, there is no way to correct the underlying cooling issue aboard GOES-17. However, scientists figured out how to minimize the loss of data during the overnight hours and most of the satellite’s image channels should experience little to no degradation at all moving forward. Corrective measures are underway to ensure the next satellites (GOES-T and GOES-U) do not suffer from the same cooling issues as GOES-17. As for its predecessor, GOES-15, it has already been moved slightly to the east and will continue to operate in tandem with GOES-17 until at least May of 2019 before eventually being decommissioned.



Example showing GOES-17 during normal operation with no degradation.



Example showing GOES-17 Infrared imagery during peak degradation.



A Friendly Reminder



Please help us keep in contact with you! If you think we may not have your current phone number, address, and/or e-mail address, the easiest way to update your information is to send an e-mail to:

emily.carpenter@noaa.gov.

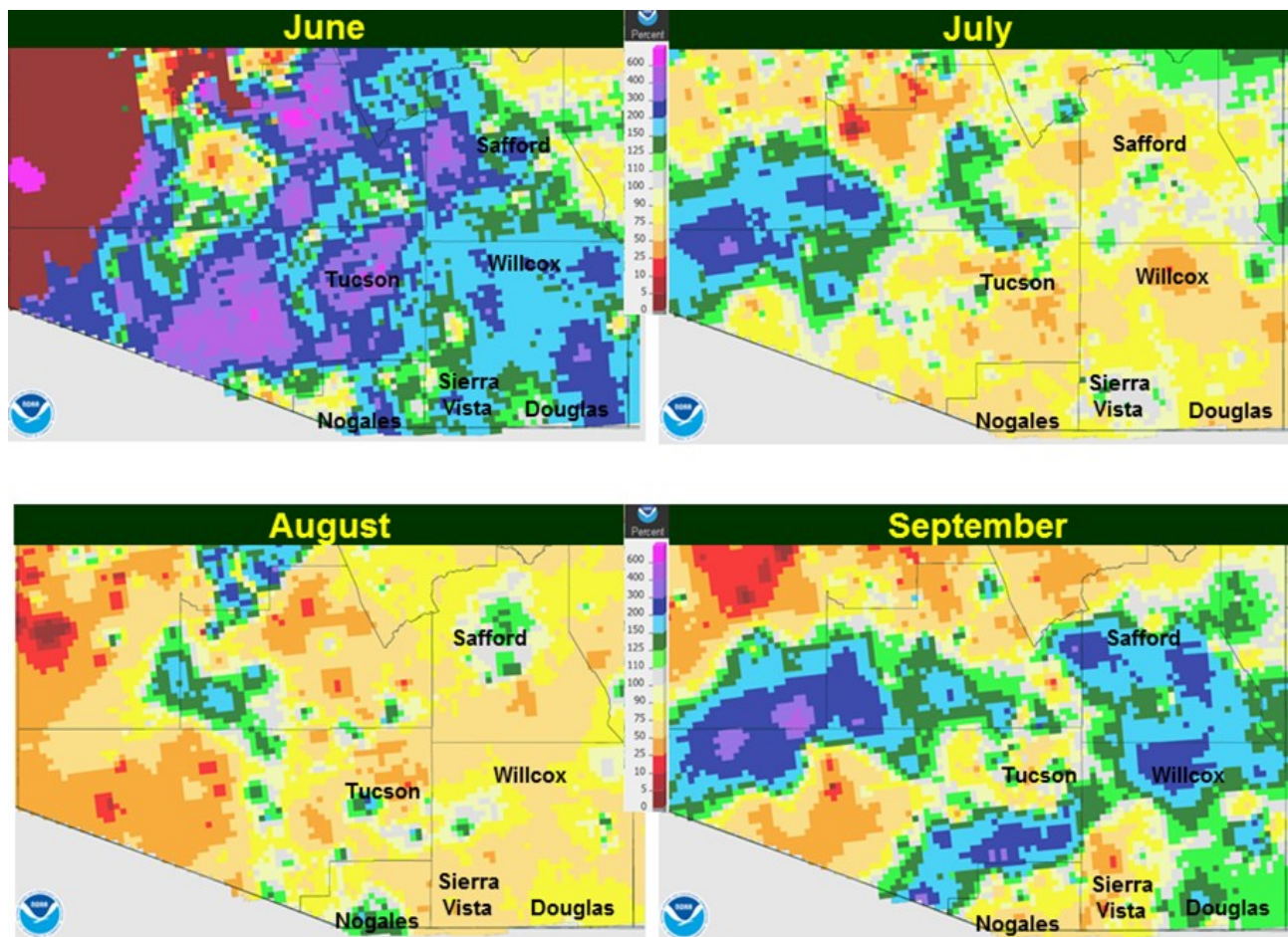


2018 Monsoon Rainfall Summary

By: John Glueck, Lead Forecaster & Climate Focal Point

The 2018 Monsoon got off to a good wet start thanks to moisture associated with Hurricane Bud. Daily rainfall records were set across many locations on June 15th and June 16th. July and August, for the most part, were drier than normal across most of southeast Arizona. Several tropical moisture intrusions during September brought above normal rainfall to portions of southeast Arizona.

The maps below show the percentage of normal rainfall for the 2018 Monsoon.
Green/Blue = Wetter than normal; Yellow/Red = Drier than normal



2018 Monsoon Rainfall Totals Across Southeast Arizona			
Pima County		Cochise County	
Arivaca	11.23"	Coronado National Memorial	10.77"
Kitt Peak	16.93"	Portal	7.78"
Vail	7.82"	Chiricahua National Monument	10.31"
Redington	5.76"	Tombstone	8.95"
Sasabe	8.36"	Sierra Vista	9.59"
Tucson International Airport	7.02"	Douglas Airport	8.97"
Green Valley	13.04"	Bisbee	10.20"
Anvil Ranch	4.91"	Willcox	7.96"
Ajo	4.47"	Cascabel	8.67"
Organ Pipe Cactus Ntnl Monument	3.52"	Benson	7.57"
Pinal County		McNeal	5.31"
Oracle State Park	10.07"	San Simon	6.74"
San Manuel	7.75"	Graham & Greenlee Counties	
Picacho Peak	8.61"	Black River Pumps	9.16"
Santa Cruz County		Safford Agricultural Station	4.00"
Nogales	9.90"	Duncan	9.07"
Patagonia	8.61"	Hanagan Meadows	14.80"
Tumacacori National Monument	8.80"		

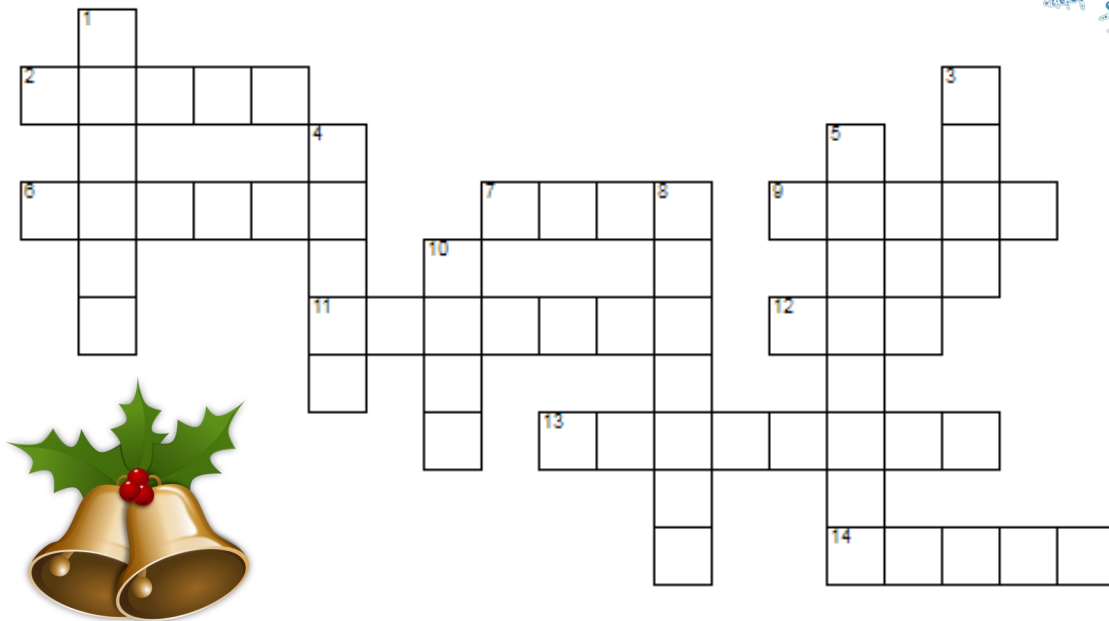
60-Second Spotter Review

What you should report:

Tornado:	Either on the ground or a funnel cloud aloft
Heavy Rain:	1/2" or more , if it fell in less than an hour
Hail:	Generally dime size or larger
High Wind:	Estimated or measured 50 mph or greater
Flooding:	"Water where it shouldn't be" , closed roads due to flooding
Snow:	1" or more (2" or more if above 5000 ft.)
Visibility:	Less than 1 mile for any reason (fog, dust, snow)
Death/Injury:	Any weather-related reason
Damage:	Any weather-related reason (most often from wind)



Winter Wonderland



*Solution found on page 8.

ACROSS

- 2 _____ ice is a thin coat of highly transparent ice that creates hazardous driving conditions.
- 6 Temperatures at or below 32 degrees F.
- 7 Atmospheric water vapor frozen into ice crystals and falling in light white flakes or lying on the ground as a white layer.
- 9 A snow _____ is used to help measure snow depth.
- 11 Currently our most valuable form of social media for storm reports.
- 12 Winter storms are associated with _____ pressure systems.
- 13 Blowing snow with sustained winds or frequent gusts greater than 35 mph and visibility less than one quarter of a mile for 3 hours or more.
- 14 The highest one day accumulation of snowfall in Tucson was almost _____ inches on December 8, 1971.

DOWN

- 1 Light snowfall that results in little or no accumulation.
- 3 The type of freeze where temperatures are less than or equal to 28 degrees F.
- 4 Snowfall is measured to the nearest _____
- 5 Community Collaborative Rain, Hail and Snow Network
- 8 A Winter Storm _____ is issued when the forecast calls for snow amounts greater than 3 inches below 5000 ft, greater than 6 inches between 5000 and 7000 ft, and 12 inches or more above 7000 ft.
- 10 _____ chill (how cold it actually feels on your skin when the _____ is factored in).





Monsoon 2018 Wrap-Up

By: Aaron Hardin, Meteorologist

The 2018 Monsoon started off with the remnants of Hurricane Bud moving through southeast Arizona just one day into the Monsoon Season. No flash flooding or severe weather occurred with Bud, but a couple funnel clouds were reported. Monsoon activity was fairly minimal until July, when activity increased markedly with a train derailment due to flash flooding in Marana on July 10th. We also saw a few cases of wind damage during the month, along with some severe hail on July 20th. August had more flash flooding events than July, with many swift water rescues performed across southeast Arizona. There was also severe hail on 3 different days in August along with a handful of wind damage reports. September experienced two heavy rainfall events on the 2nd in Amado and on the 19th in the Safford area. We'll focus on a few impactful events from Monsoon 2018 in the next paragraphs.

Remnants of Hurricane Bud on June 16th

The remnants of Hurricane Bud moved through southern Arizona on June 16th at the very beginning of the monsoon season. Bud initially formed as a tropical depression on June 9 south of Mexico and became a hurricane late on June 10 with movement to the north. It crossed over southern Baja California and weakened to a tropical depression on June 15,



June 16, 2018: Funnel cloud near Vail. (Photo: Mike Pendergast)

then became a remnant low on June 16 as it moved into southern Arizona. Moisture from the remnants of Bud fueled widespread showers and thunderstorms across southeast Arizona with some areas receiving heavy rain. Additionally, funnel clouds were reported in Vail (photo above) and Cochise. These were not classified as tornados because the funnel was not in contact with the ground. By definition, a tornado is a rotating column of air that is in contact with the cloud and the ground while a funnel cloud is a rotating column of air not in contact with the ground.

Wind Damage and Severe Hail in South Central Arizona on July 20th

Scattered thunderstorms impacted Graham, Cochise, and Pima counties during the afternoon and early evening. These storms produced the first reports of severe hail (≥ 1 " in diameter) for the monsoon season. Hail up to 1.5" was reported in Corona de Tucson (photo right) and damaged many

cars in the area. Later in the afternoon there were multiple reports of 1"-1.5" hail in and around the Sierra Vista area as well as near Benson and Dragoon. Damaging winds also blew down 7 power poles near Dragoon Rd, which knocked out electricity for some people in the area. This caused Dragoon Rd to be closed for a period of time because power lines were lying on the road.

Flash Flooding and Wind Damage in Tucson on August 22nd

A cluster of storms formed on the northwest side of Tucson and produced heavy rainfall, strong winds, and hail on August 22nd. These storms caused property damage as well as flash flooding. Hail 1" in diameter fell over the northern portion of Oro Valley. There were many downed trees reported in Marana, Oro Valley, and the northwest side of Tucson. Some of these trees damaged houses (photo next page), fences, retaining walls, parking



July 20, 2018: Hail near Corona de Tucson. (Photo: KVOA)

Monsoon Wrap-Up Continued...



August 22, 2018: Wind damage in Marana. (Photo: Twitter)

structures and disrupted traffic by falling into the road. A power pole was also knocked over and one palm tree caught fire after being struck by lightning. Heavy rain of 1 to just over 2 inches fell over parts of Oro Valley, Tortolita and Casas Adobes, causing flash flooding of several washes along with significant street flooding. At least four swift water rescues had to be performed to rescue stranded motorists and many roads were closed. Around 1-2 feet of water was flowing along Pima Farms Road and made it up to the front porch of some residents' homes.



August 22, 2018: Stranded motorist in NW Tucson. (Photo: KOLD)

Flooding in Amado and Severe Hail in Marana and Willcox on September 2nd

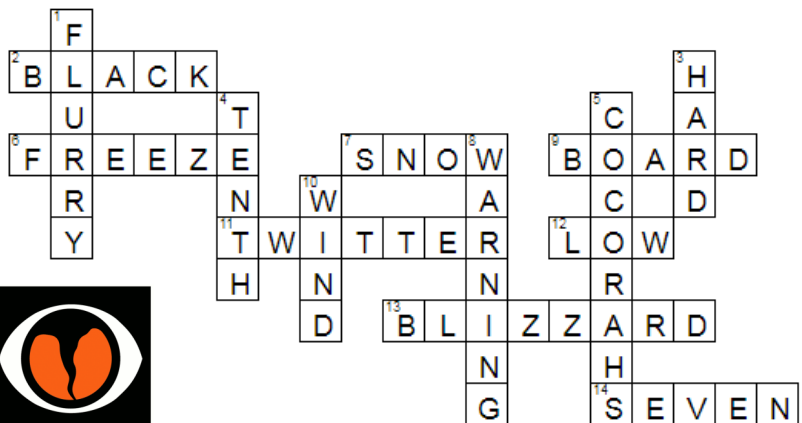
Thunderstorms produced large hail, heavy rain and flash flooding in Pima, Santa Cruz, and Cochise Counties during the evening and overnight hours of September 2nd. This was one of the last events of Monsoon 2018. Both Willcox and Amado had hail up to 1.5" in diameter reported. But the biggest threat with these storms was the flash flooding they caused. Thunderstorms produced 3 to 5 inches of rain in Amado and along Sopori Wash, which led to extensive flash flooding in Amado. Water flowed at depths ranging from 2 to 5 feet deep through several commercial properties including a restaurant, feed store, automotive shop, and youth center, causing substantial damage to the buildings and their contents. Additionally, several RVs suffered water damage at a RV storage park (photo above).



Sept 2, 2018: Flooding in Amado. (Photo: Green Valley News)

Damage also occurred to Arivaca Road and others in the area. Elsewhere in southern Arizona there was flowing water on I-10 near Bowie which caused a temporary closure of the interstate. Several swift water rescues were performed in the Bowie area as well. Heavy rainfall of 1"-2" on the northwest side of Tucson caused flash flooding and erosion of road surfaces on Shannon Road north of Magee Road and near the intersection of Cortaro Farms Road and West Club Drive.

Winter Wonderland



WFO Tucson Attends US Border Patrol Citizen's Academy

By: Gary Zell & Chris Rasmussen, General Forecasters

As part of the effort to improve the partnership between the US Border Patrol (USBP) and NWS Tucson, staff members Chris Rasmussen and Gary Zell attended the USBP Citizen's Academy. The class met one night each week for eight consecutive weeks and encompassed all aspects of the agency's operations. This involved field visits to a Check-point location, Mobile Surveillance Vehicle and the CBP Air and Marine Operations Base. Familiarization with the Sector Headquarters was comprised of tours of the Joint Information Operation Center, Common

Operating Picture room and the Forensics Lab. Other activities included hands-on exercises in the VirTra V-300 firearms training simulator, a simulated traffic stop and less than lethal firearms training. While attending the Academy, Gary and Chris learned about the impacts that weather has on USBP equipment and operations. Obtaining key weather threshold values has already paid dividends by resulting in the communication of more pertinent information in WFO Tucson DSS (decision support services) briefings to the Border Patrol Search,

Trauma and Rescue unit (BORSTAR) and to the Office of Incident Management (OIM). Chris and Gary were also able to coordinate with the Tucson Sector's Operations Division Chief and the Air and Marine pilots, laying the ground work for future IDSS opportunities.



Jeremy Michael arrives from NWS Elko, Nevada



I grew up in Berkeley Springs, West Virginia. This is where my love for weather began. As a kid, I used to be afraid of thunderstorms and strong winds. This fear eventually turned into curiosity and further into a passion. After high school, I moved to North Carolina to earn a degree in Atmospheric Science at the University of North Carolina at Asheville. After graduation, I moved to Elko, Nevada to take an intern position. I worked there for a few years gaining valuable experience and knowledge of fire weather and forecasting in complex terrain. Then I took on an

opportunity to work for NESDIS-SAB in College Park, MD, where I supported Puerto Rico, Hawaii, and WPC in satellite forecasting of heavy rain. I also worked at the Washington Volcanic Ash Advisory Center, where I produced forecasts for volcanic ash in South and Central America, including portions of the Pacific Islands. I eventually returned to the NWS in Elko, accepting a forecaster position.

After I returned to Nevada, I accomplished a major career goal of becoming a certified Incident Meteorologist (IMET). I have wanted to become an IMET for quite some time and always wanted to work on large wildfires providing direct weather support to fire personnel. I was able to do this on several fires last year in New Mexico, Utah, Nevada, Oregon, and California.

My love for weather, the desert, outdoor recreation/hobbies has now led me to Tucson. I am very excited to be here

and looking forward to experiencing everything southern Arizona has to offer. Between the wonderful food options, hiking, and general outdoors, I will be very busy. I enjoy snowboarding and skiing during the winter months and attend concerts and sporting events other times. In fact, I was able to attend my first U of A game against ASU this past fall. My favorite sports teams are mostly DC/Baltimore teams with WVU being my favorite college team. Even being a WVU fan, I can still cheer for U of A sports and look forward to attending more basketball and football games in the future.



Randy Henderson is our newest Electronics Technician



Randy comes to us from the Federal Aviation Administra-

tion (FAA) in Charlotte, North Carolina, where he was an Airway Transportation System Specialist. He brings with him experience working on systems similar to those we utilize in the NWS. Randy is a native New Yorker (from The Bronx) who served in the NAVY for 11 years. He is married to Gabriella (from Albuquerque, NM) and has 5 children (ages 2 to 19).

Randy is a self-described

extrovert and "true nerd," who loves electronics, video games and cartoons. He loves BBQ any time of the year. Growing up in NYC, Randy had the privilege of working with all types of people from different cultures, ethnic backgrounds and experiences, and joining the Navy has broadened that experience for him. He is a team player who is excited to join our office here in Tucson.

Carl Cerniglia Promoted to Lead Forecaster



Carl's 31 year NWS career began in Reno Nevada as a student trainee during the summer of 1987. After graduating from the University of NY at Albany in

1988, he moved to Glasgow MT as an intern before being reassigned to the Seattle NWS office in early 1990. Four years later he accepted a forecaster position at the NWS forecast office in Portland, Maine. Just two years later he transferred to the Albany NY forecast office (his hometown), where after a five year tenure, he decided to return to the marine climate of the Seattle forecast office in 2002. It was in Seattle where he became interested in fire weather forecasting and entered the challenging and rewarding IMET program. After ten years in the Pacific Northwest, another

transfer brought him to Tucson in 2012 for some much needed heat and sunshine for his family members where he continues as an IMET and the office Fire Weather Focal Point. In August of this year, Carl happily accepted a promotion to a Senior Forecaster position in the Tucson Office. When time and the heat allows, Carl enjoys being active outdoors by hiking, backpacking, hunting and occasionally racing his car at the drag strip or on an autocross course.

Congratulations

Maddie Powell joins the team as NWS Pathways Student

Maddie began her Pathways Program with the National Weather Service Tucson in June of 2018. She will finish her M.S in Atmospheric Sciences from the University of Arizona in May of 2019, having received a B.S in Applied Meteorology from Embry-Riddle Aeronautical University-Prescott, AZ in May of 2017. Between Embry-Riddle and the University of Arizona, Maddie spent the summer volunteering with the National Weather Service in her hometown of Flagstaff, AZ. So far, Maddie has assisted with

flood prone location maps of Tucson in GIS, provided operational assistance during the monsoon season, became certified in upper air observations, and is excited to continue developing her forecasting skills as the year progresses. In her spare time, Maddie can be found working on her thesis, playing Xbox with friends and spending time with fiancé, Kenton.



Don't Forget to Find us on Social Media!



U.S. National Weather Service
Tucson Arizona



@NWSTucson



www.youtube.com/NWSTucson

We're on the web!
www.weather.gov/tucson

*Happy
Holidays*

L O V E P E A C E H O P E

National Weather Service—Tucson, AZ

520 N. Park Avenue, Suite #304

Tucson, Arizona 85719

Phone: (520) 670-6526

Fax: (520) 670-5167

The Staff at NWS Tucson

Meteorologist in Charge

Marc Singer

Administrative Support Assistant

Leslie Cole

Warning Coordination Meteorologist

Ken Drozd

Science and Operations Officer

Dan Leins

Electronic System Analyst

Chris Carney

IT Specialist

Evelyn Bersack

Electronic Technicians

Rick Leupold, Randy Henderson

Service Hydrologist

Erin Boyle

Observations Program Leader

Vacant

Senior Forecasters Carl Cerniglia Jeff Davis Brian Francis John Glueck Jim Meyer

Forecasters Emily Carpenter Glenn Lader Jeremy Michael Chris Rasmussen Gary Zell

Meteorologist Interns Aaron Hardin Rob Howlett Vacant

NWS Pathways Student Madelyn Powell

